

21819

3 Hours / 70 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Illustrate your answers with neat sketches wherever necessary.
 - (3) Figures to the right indicate full marks.
 - (4) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following :

10

(a) Prove that $\frac{1}{\log_3 6} + \frac{1}{\log_8 6} + \frac{1}{\log_9 6} = 3$.

(b) Find x , if $\begin{vmatrix} 4 & 3 & 9 \\ 3 & -2 & 7 \\ 11 & 4 & x \end{vmatrix} = 0$.

(c) Without using calculator, find the value of $\cos(105^\circ)$.

(d) The area of a rectangular garden is 3000 m^2 . Its sides are in the ratio $6 : 5$. Find the perimeter of the garden.

(e) Find the area of ring between two concentric circles whose circumferences are 75 cm and 55 cm .

(f) Find the range and coefficient of range $40, 52, 47, 28, 45, 36, 47, 50$.

(g) The two sets of observations are given below :

Set I	Set II
$\bar{x} = 82.5$	$\bar{x} = 48.75$
$\sigma = 7.3$	$\sigma = 8.35$

Which of two sets is more consistent ?

[1 of 4]

P.T.O.

2. Attempt any THREE of the following :

12

- (a) Solve the equations by Cramer's rule :

$$x + y + z = 3, x - y + z = 1, x + y - 2z = 0$$

- (b) If
- $A = \begin{bmatrix} 2 & 4 & 4 \\ 4 & 2 & 4 \\ 4 & 4 & 2 \end{bmatrix}$
- , find
- $A^2 - 8A$
- .

- (c) Resolve into partial fractions

$$\frac{3x + 2}{(x + 1)(x^2 - 1)}$$

- (d) A metal strip having sides
- $17 \times 7 \times 5$
- cm is melted down and minted into coins each of diameter 1.4 cm and thickness 0.08 cm. Assuming no wastage, how many coins can be minted ?

3. Attempt any THREE of the following :

12

- (a) Prove that

$$\tan 70^\circ - \tan 50^\circ - \tan 20^\circ = \tan 70^\circ \tan 50^\circ \tan 20^\circ.$$

- (b) Prove that
- $\frac{1 + \sin \theta - \cos \theta}{1 + \sin \theta + \cos \theta} = \tan\left(\frac{\theta}{2}\right)$
- .

- (c) Prove that
- $\frac{\cos 2A + 2 \cos 4A + \cos 6A}{\cos A + 2 \cos 3A + \cos 5A} = \cos A - \sin A \tan 3A$

- (d) Prove that

$$\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ = \frac{3}{16}$$

4. Attempt any **THREE** of the following :

12

(a) Find the adjoint of matrix

$$A = \begin{bmatrix} 2 & 5 & 3 \\ 3 & 1 & 2 \\ 1 & 2 & 1 \end{bmatrix}$$

(b) Resolve into partial fractions

$$\frac{x^4}{x^3 + 1}$$

(c) Prove that $\tan^{-1}(1) + \tan^{-1}(2) + \tan^{-1}(3) = \pi$.

(d) Prove that

$$\sin^{-1}\left(\frac{3}{5}\right) - \sin^{-1}\left(\frac{8}{17}\right) = \cos^{-1}\left(\frac{84}{85}\right)$$

(e) Without using calculator, prove that

$$\sin 420^\circ \cos 390^\circ + \cos (-300^\circ) \sin (-330^\circ) = 1$$

5. Attempt any **TWO** of the following :

12

(a) Attempt the following :

(i) Find the acute angle between the lines $y = 5x + 6$ and $y = x$.

(ii) Find the equation of the line passing through the point (4,5) and perpendicular to the line $7x - 5y = 420$.

(b) Attempt the following :

(i) Find the length of perpendicular from the point (2,3) on the line $4x - 6y - 3 = 0$.

(ii) Find the equation of the line passing through (1,7) and having slope 2 units.

P.T.O.

(c) Attempt the following :

- (i) A square grassy plot is of side 100 metres. It has a gravel path 10 meters wide all round it on the inside. Find the area of the path.
- (ii) The volume of a sphere is $\frac{88}{21}$ cubic meters. Find its surface area.

6. Attempt any TWO of the following :

12

(a) (i) Find the mean deviation from mean of the following distribution :

C.I.	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
f_i	5	8	15	16	6

(ii) Find range & coefficient of range for the following data :

C.I.	10 – 19	20 – 29	30 – 39	40 – 49	50 – 59
f	15	25	13	17	10

(b) Calculate standard deviation and coefficient of variance of the following table :

Marks below	5	10	15	20	25
No. of Students	6	16	28	38	46

(c) Solve the following equations by using matrix inversion method :

$$x + y + z = 6, 3x - y + 3z = 10, 5x + 5y - 4z = 3$$
